

## Experimental Design

- Identify...

- ① Control
- ② Randomization
- ③ Replication

### **1. CONTROL**

- effects of lurking / confounding vars.
- compare several different trts.
- control variable (placebo)  
(old trt.)  
(no trt.)

## \*2. RANDOMIZATION

- use chance to assign exp. units to trts.
  - reduce lurking vars.
- 

How?

be able to do trt. 1

trt. 2

Table of Random Digits:

(in book)

Calculator:

<del>04</del>	<del>Mike</del>
<del>03</del>	<del>Meredith</del>
<del>02</del>	<del>Nicole</del>
<del>01</del>	<del>Kevin</del>
05	Cara
06	Pat
07	Julia
08	Dan
09	Brittany
10	TJ

Dan

↓  
5

### 3. REPLICATION

(the expt or study)

- many times
  - on many diff. exp units
  - reduce chance of "fluke" results  
    ↳ variation in results.
- 

*Why?*

#### Statistical Significance-

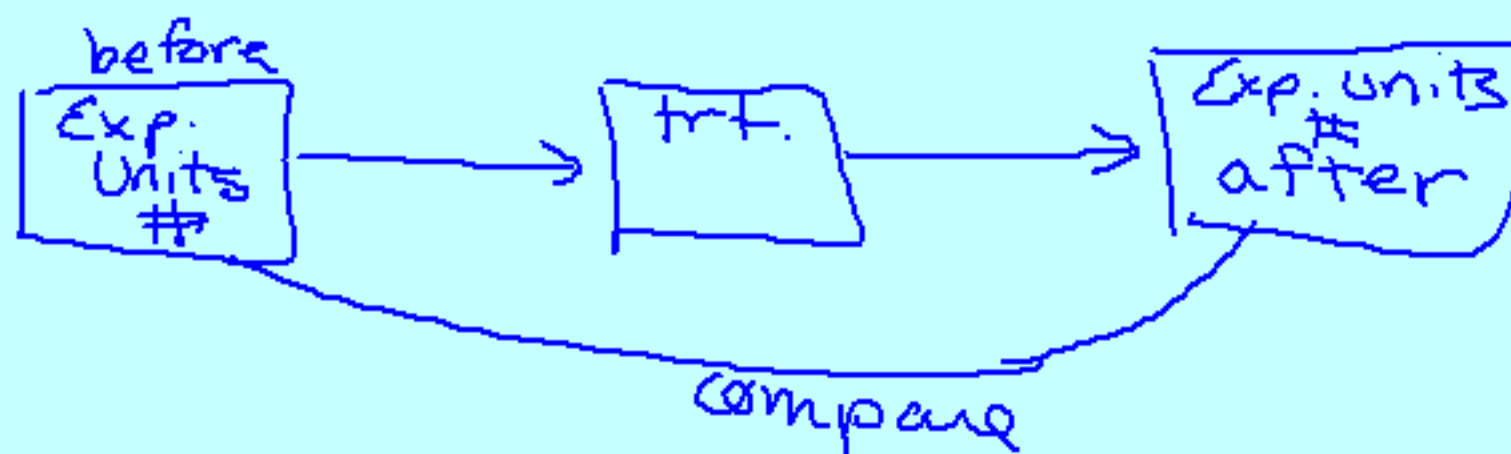
an observed result so significant (happens so often) that it would rarely occur by chance.

### Section 3.2: Experimental Design

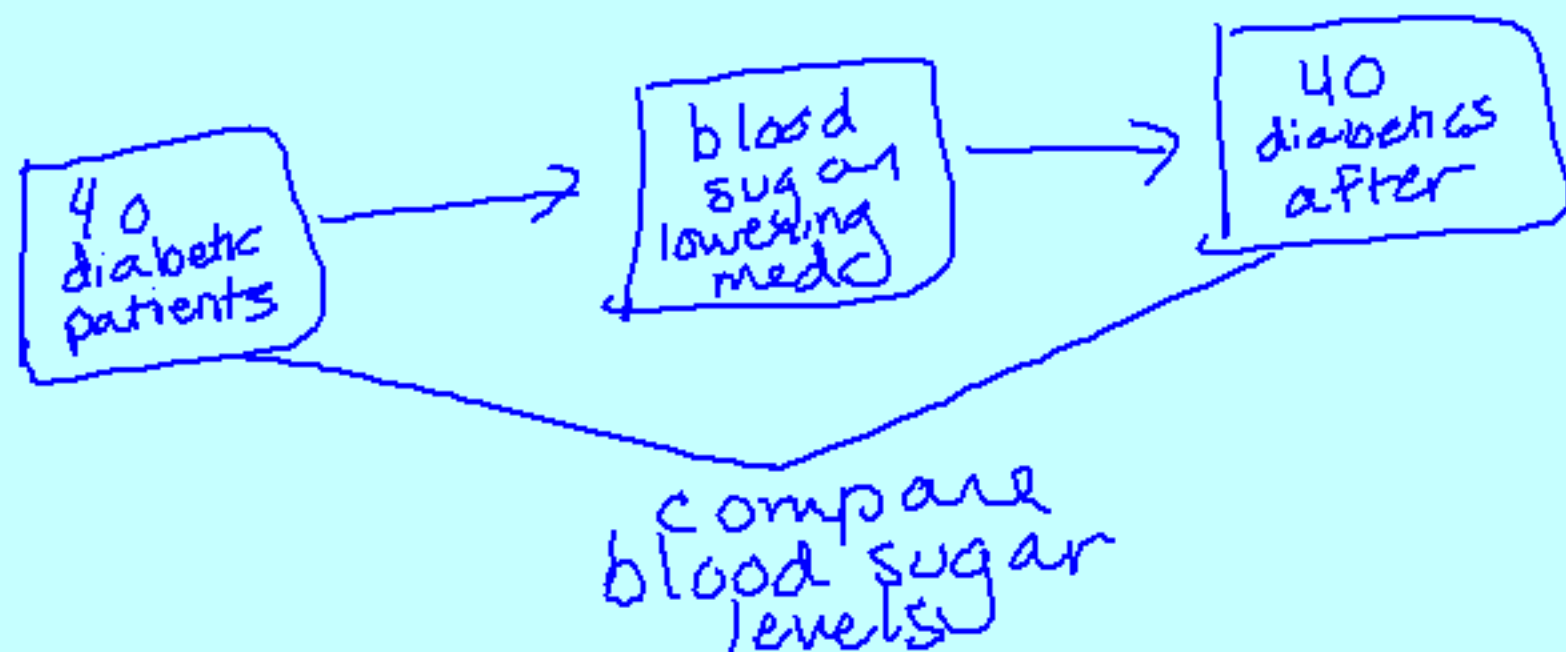
#### (1) Comparative Experiment

- a single trt. is applied to all exp. units
- measure before & after  
& compare

Design: Generic:



**Example:**



**Concerns:**

- no control group
- no randomization
- placebo effect
- bias

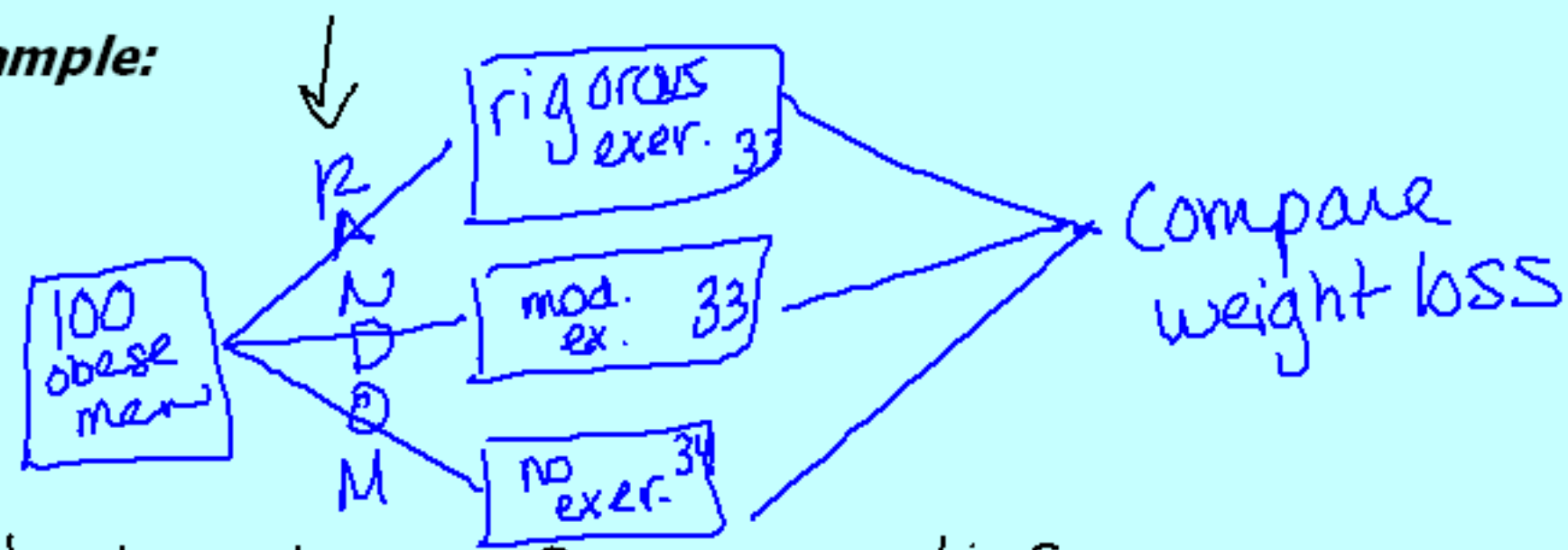
**(2) Randomized Comparative Experiment**  
**(a.k.a. Completely Randomized Design)**

- use chance to divide exp units into trt. groups
- compare trt. groups results

**Design: Generic:**



**Example:**



- diet, placebo?, genetics

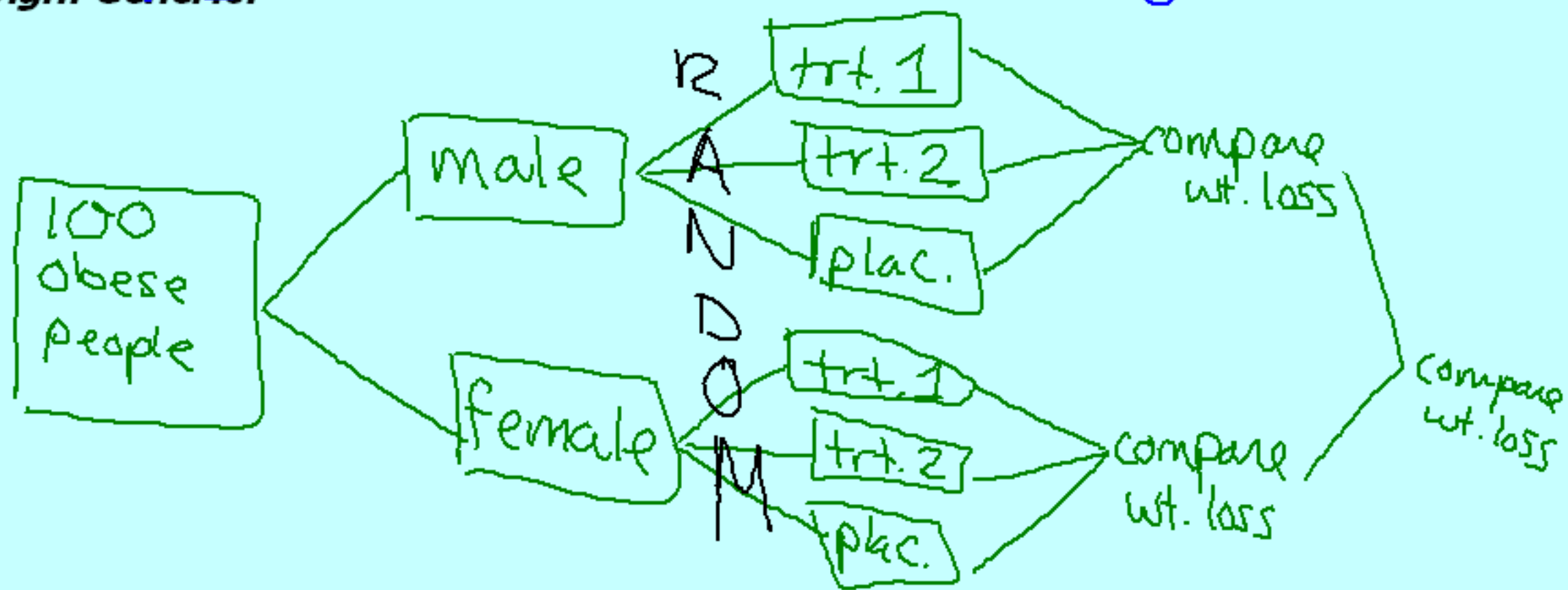
**Other:**

= double blind expt. - master list

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researcher & exp unit  
doesn't know who gets  
which trt.

### (3) Block Design (Blocking)

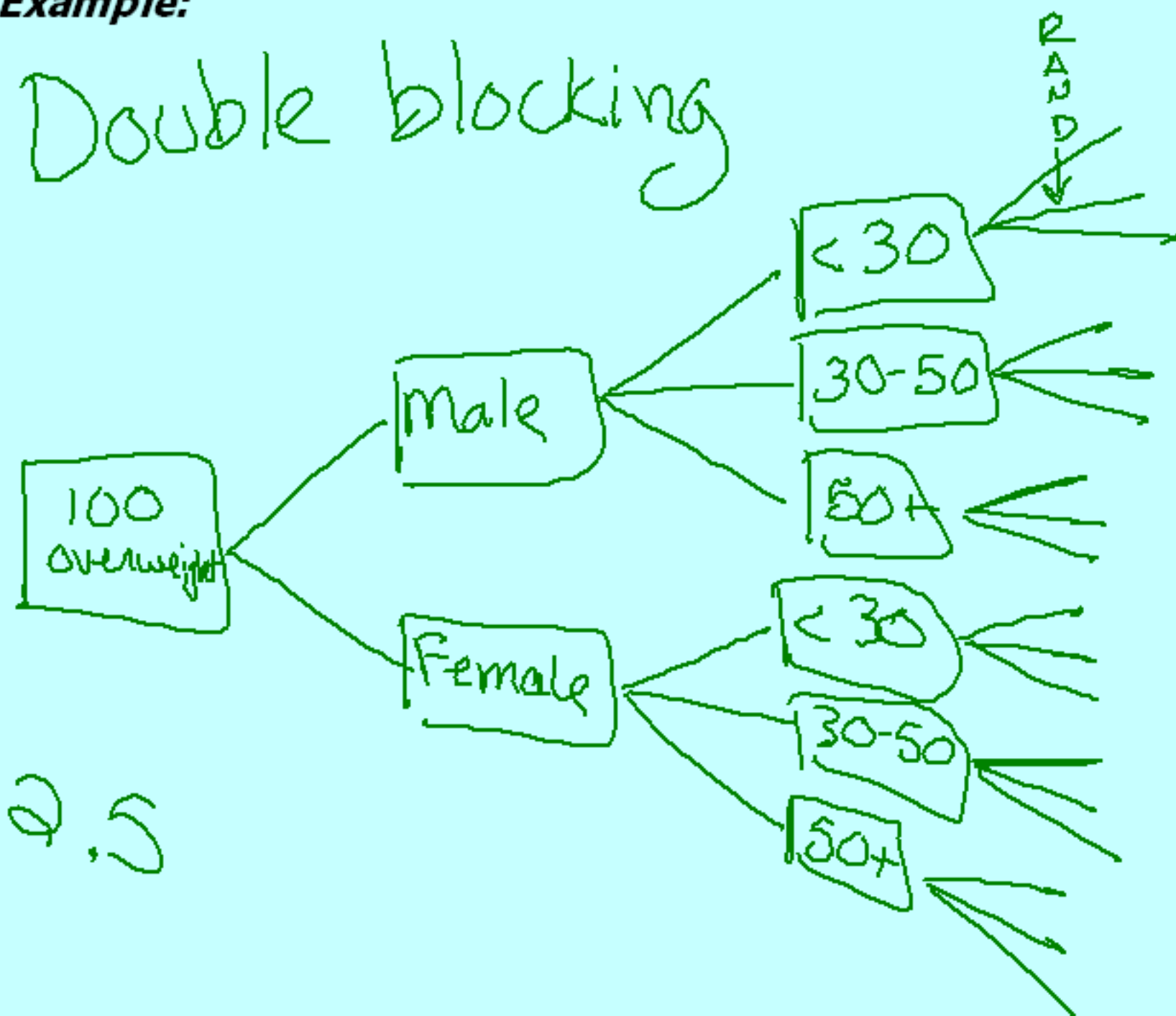
- special type of completely randomized des.
  - Block = group of exp. units that are known to be alike in some way. Ex: gender
  - split e.u.'s into blocks, then apply trts. (same to each block)
- Design: ~~Generic~~





**Example:**

# Double blocking



Q.5

#### (4) Matched Pairs Design (specific type of block design)

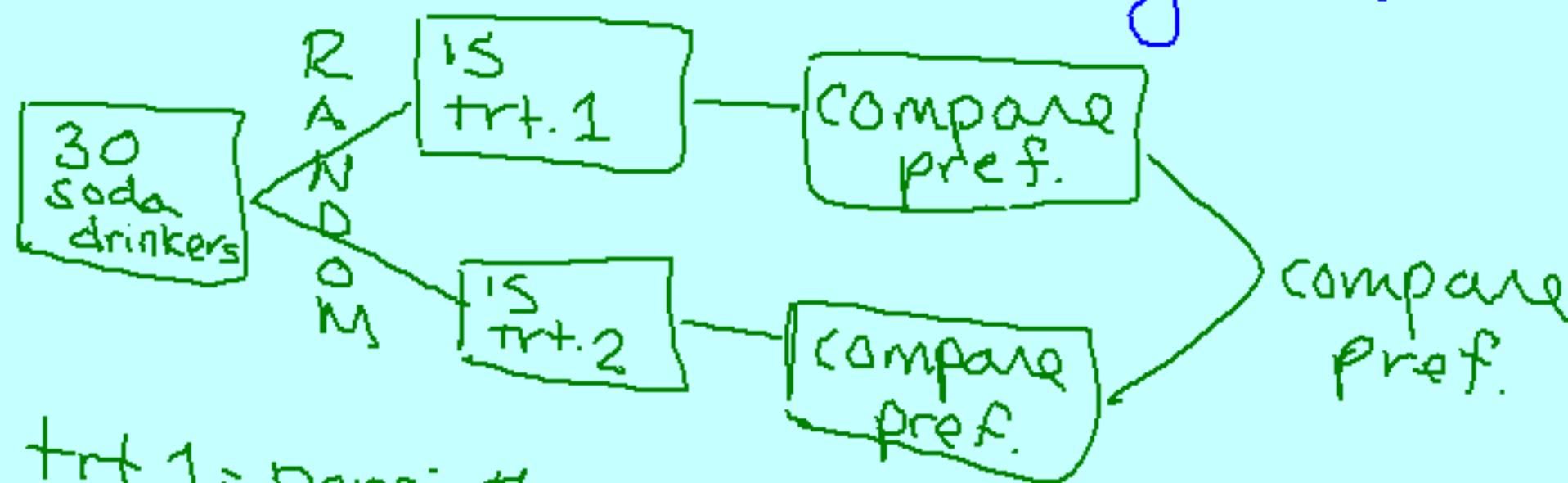
- 2 trts (only)

\* each exp unit gets both trts.

\* Ex: pepsi vs. coke

Design: ~~Generic~~

\* randomly assign  
which trt. exp. unit  
gets first.



trt. 1 = pepsi, then coke  
trt. 2 = coke, then pepsi

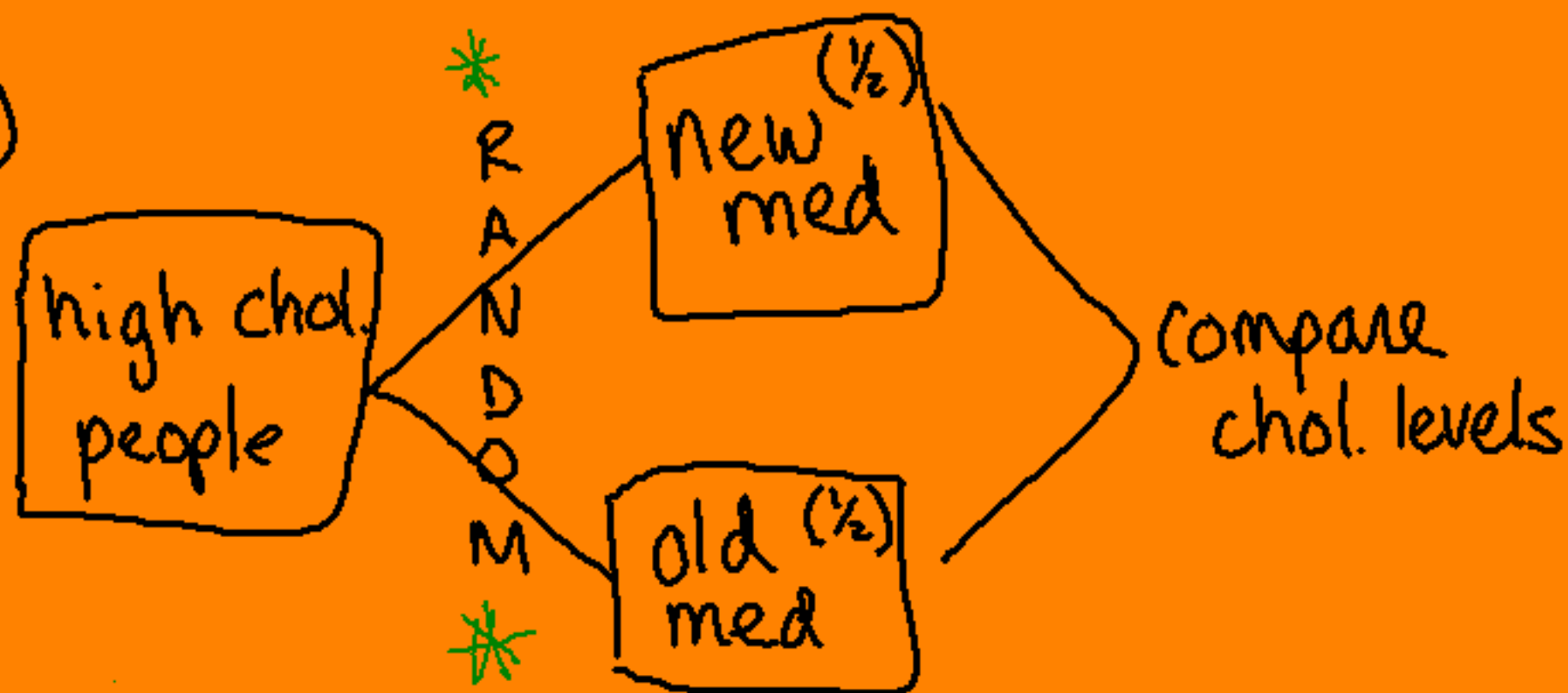
**Example:**

**Concerns:**

- \*no control
- bias?
- certain can't be done matched pairs  
Ex: - medication

AP 2000

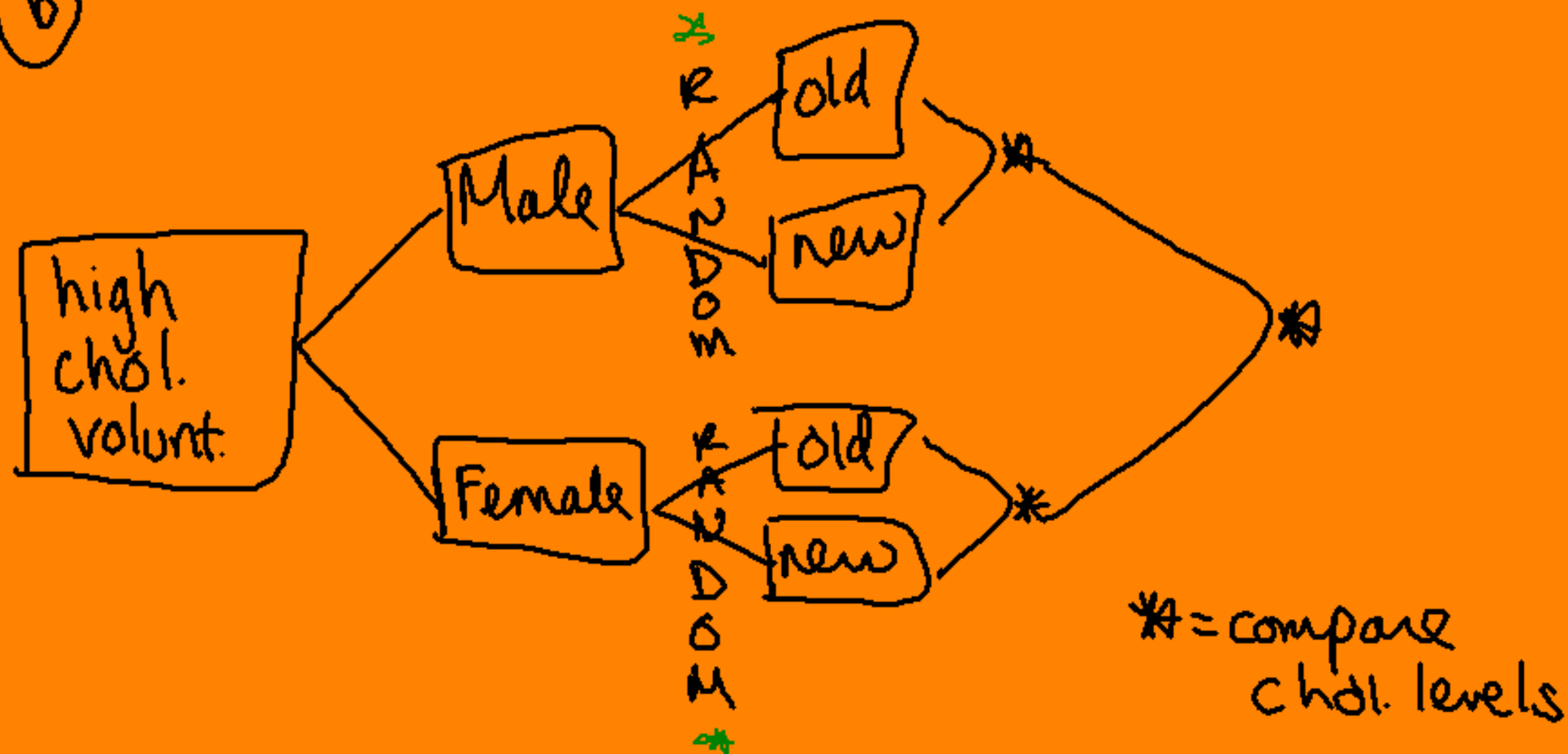
(a)



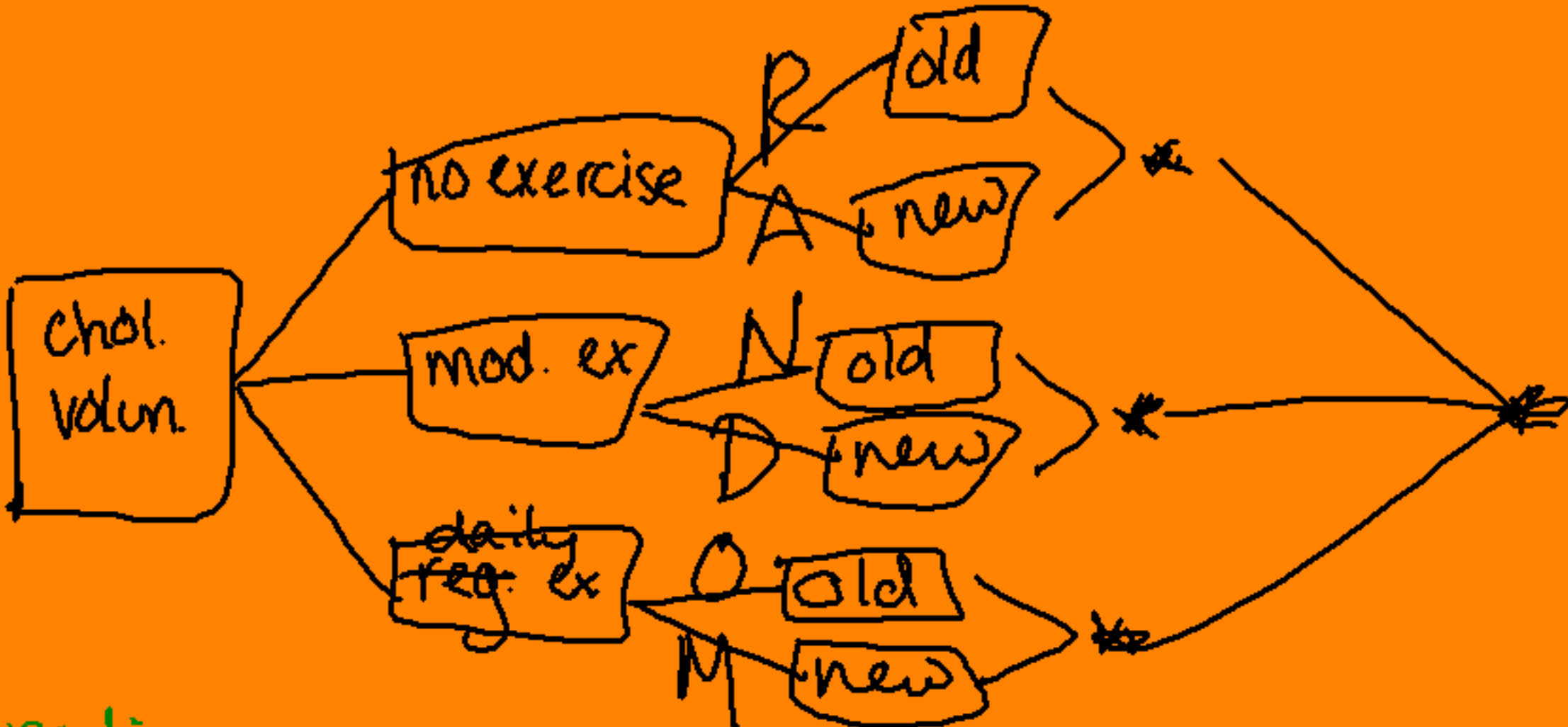
First, give each volunteer a #, then

~~First~~, split volunteers randomly (using software or table) so 1/2 get new drug / 1/2 get old drug. Administer drug & then measure chol. levels.

(b)

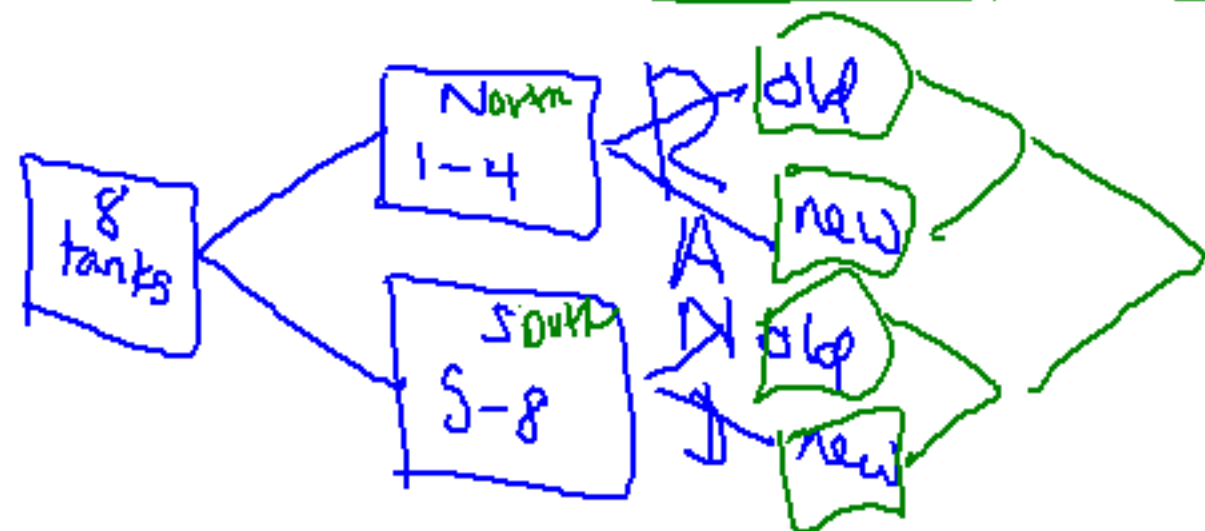
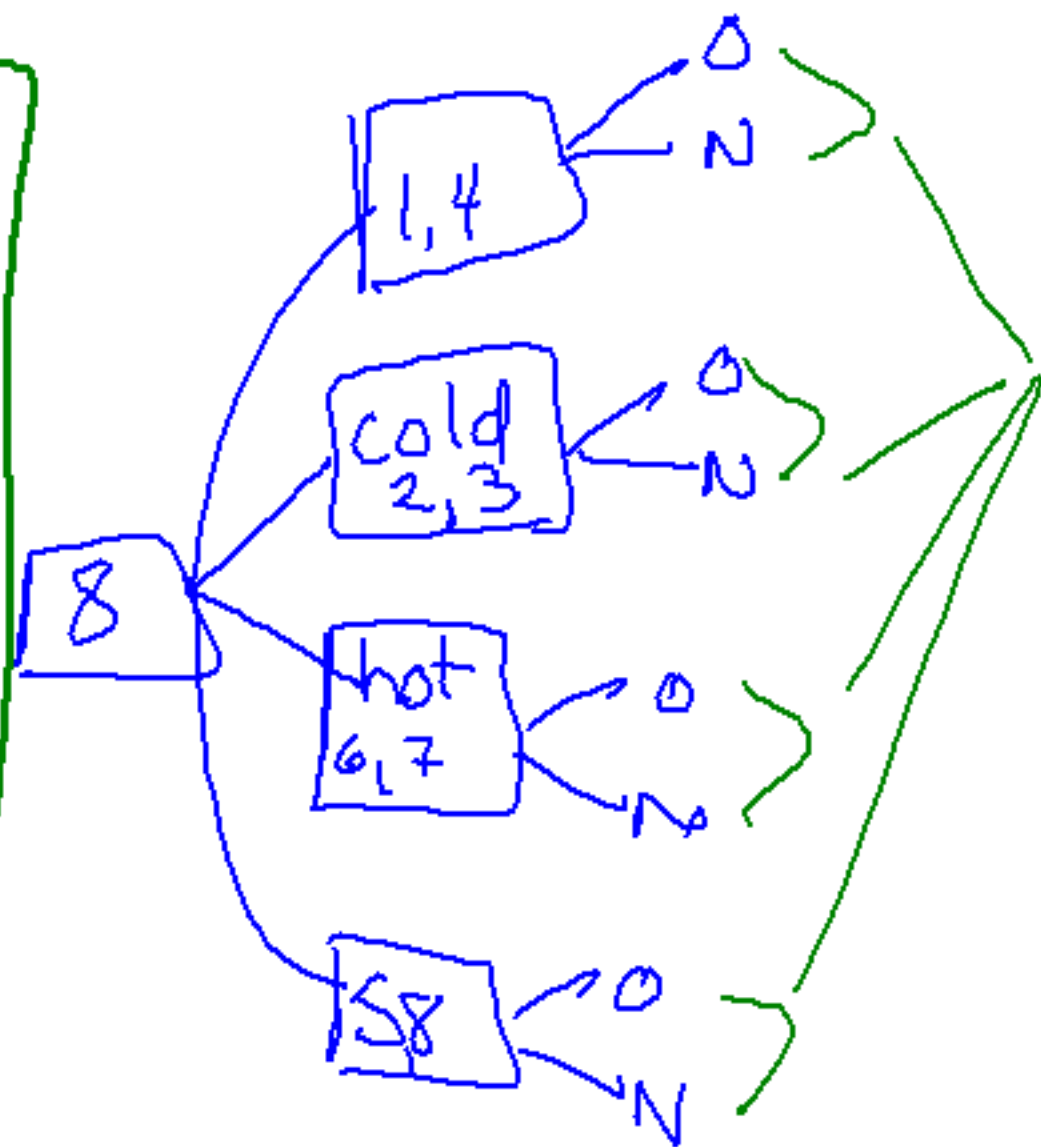
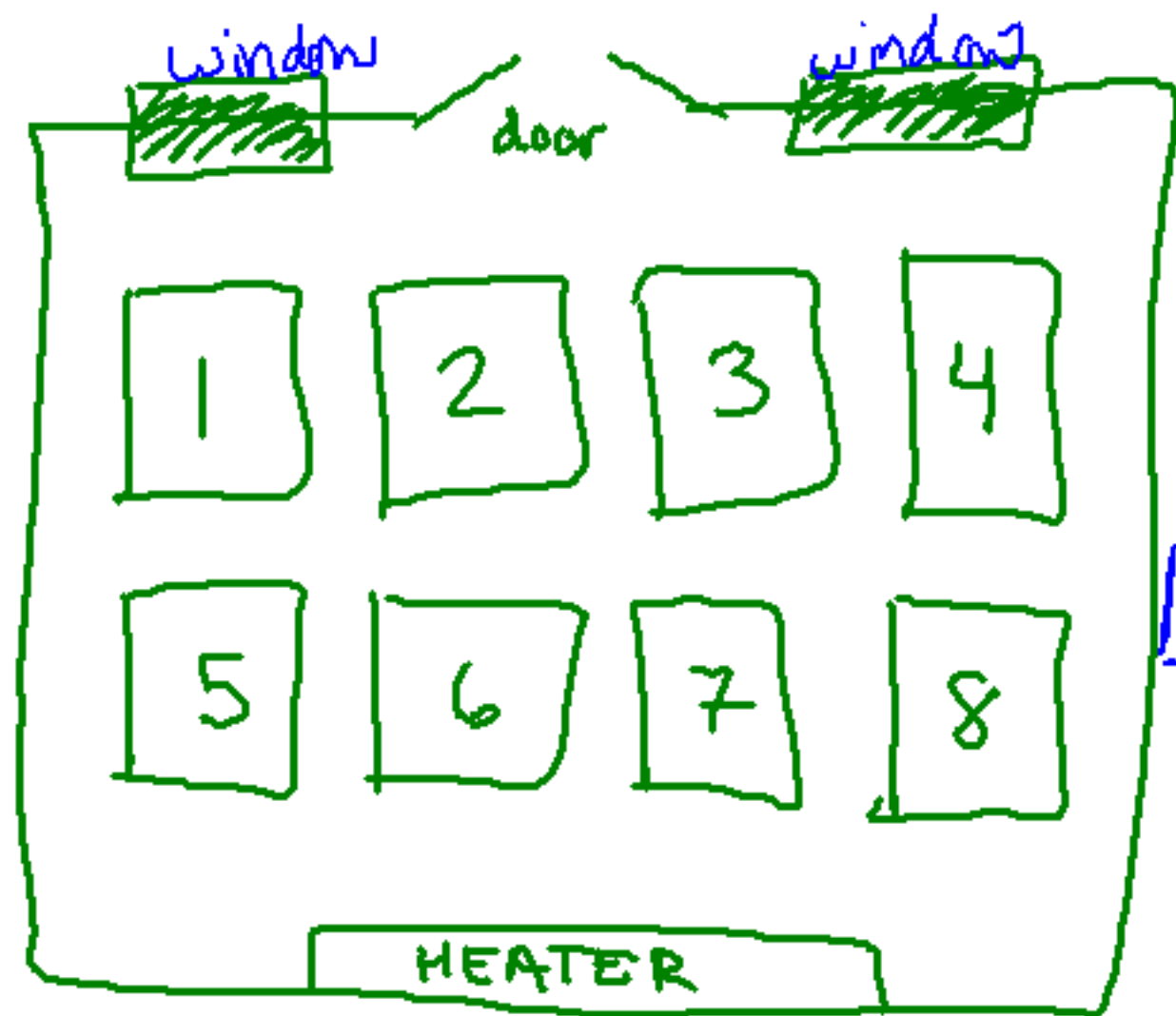


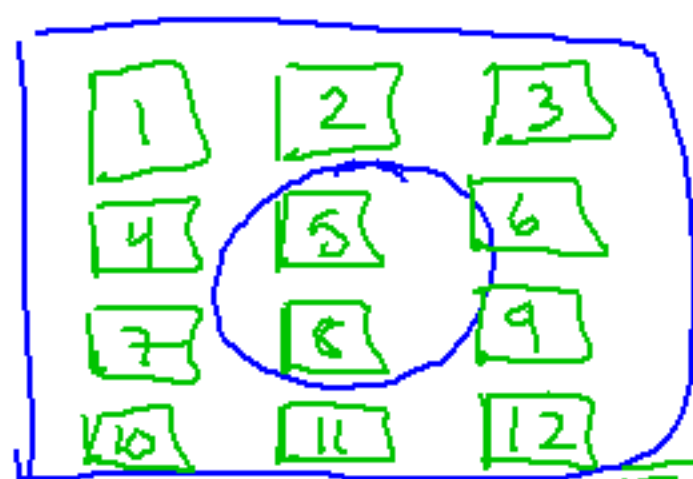
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predisposed  
high chol

\* = compare  
chol. levels





\* = compare growth

